

Serial No.: 10/686,508
Office Action Date: 4/21/2005

Filed: 10/14/2003
Amendment Date: 7/19/2005

Amendments to the Specification:

Please replace paragraph [0001] with the following amended paragraph:

[0001] This invention is related to commonly assigned and co-pending United States Serial Number 40/_____ 10/686,034 (Attorney Docket Number GP-304194.

Please replace paragraph [0046] with the following amended paragraph:

[0046] While any variety of rearrangement or transformation of the variables may be accomplished in accordance with a particular usage or reference objective, a presently preferred arrangement for storage is one which is efficiently indexable by certain uncontrolled or indirectly controlled ones of the parameters of the powertrain which serve as independent variables in their own right in a preferred control for the powertrain. In accordance with such a preferred control, No and To are utilized as independent variables in the determination of preferred operating points for the input torque and speed which will allow for torque command generation for the engine and speed control of the transmission via transmission electric motor torque control. Such torque commanded operation of the engine is generally well known in the arena of torque based engine controls and is not further detailed herein. An exemplary speed control for a hybrid transmission is described in detail in commonly assigned and co-pending United States Serial Number 40/_____ 10/686,511 (Attorney Docket Number GP-304140) which is incorporated herein by reference. Hence, a logical and preferred rearrangement or transformation of the variable is better visualized with reference to the bottom portion 112 of FIG. 4 wherein the independent variables are in a first set of columns labeled "inputs" and the dependent variables are in a second set of columns labeled "outputs."

GMC3151

2 of 11

Serial No.: 10/686,508
Office Action Date: 4/21/2005

Filed: 10/14/2003
Amendment Date: 7/19/2005

Please replace paragraph [0051] with the following amended paragraph:

[0051] The process at 105 iterates through the values of T_o in the region of interest and motor power and aggregate motor and power electronics losses are mapped in the N_i/T_i region. Motor power is determined in accordance with EVT torque and speed models derived from Newtonian based physical modeling for rotating bodies (e.g. free body diagrams) for the various modes of the EVT. The matrix equations for motor torque are derived and placed into the following form for calculation of T_a and T_b from T_i and T_o for the present iteration in N_o/T_o :

$$\begin{bmatrix} T_a \\ T_b \end{bmatrix} = \begin{bmatrix} K_{11} & K_{12} \\ K_{21} & K_{22} \end{bmatrix} \begin{bmatrix} T_i \\ T_o \end{bmatrix}$$

where T_a is motor A torque,

T_b is motor B torque,

T_i is EVT input torque,

T_o is EVT output torque, and

K_n are system constants including reflected gear ratios and inertias.

$$\begin{bmatrix} N_a \\ N_b \end{bmatrix} = \begin{bmatrix} K_{11} & K_{12} \\ K_{21} & K_{22} \end{bmatrix} \begin{bmatrix} N_i \\ N_o \end{bmatrix}$$

Likewise, the matrix equations for motor speeds are derived and placed into the following form for calculation of N_a and N_b from N_i and N_o for the present iteration in N_o/T_o :

where N_a is motor A speed,

GMC3151

3 of 11

Serial No.: 10/686,608
Office Action Date: 4/21/2005

Filed: 10/14/2003
Amendment Date: 7/19/2005

Nb is motor B speed,
Ni is EVT ~~inout~~ input speed,
No is EVT output speed, and
Kn are system constants including reflected gear ratios.

From the matrix equations generating torques and speed, motor power is derived as follows:

$$P_{\text{motor_A}} = T_a * N_a, \text{ and}$$
$$P_{\text{motor_B}} = T_b * N_b$$

Motor power, $P_{\text{motor_A}}$ and $P_{\text{motor_B}}$, are mapped in the N_i/T_i region for the present iteration in N_o/T_o .